# SOVIET ARCTIC ECONOMIC ACTIVITY

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# Soviet Arctic Economic Activity

## Summary

Despite its remote location and extremely harsh environment, which continue to constrain all aspects of resource exploitation and to add significantly to developmental costs, the Soviet Arctic is playing an increasingly important role in supplying natural resources for the Soviet economy. Oil and natural gas resources of northern West Siberia are now the mainstay of Soviet energy production and will continue to dominate throughout the 1980s. Mineral deposits in the European Arctic, East Siberia, and the Far Northeast will continue to account for the majority of Soviet nickel, apatite, and diamonds and to be substantial contributors to coal, tin, and gold production. Although severe environmental and locational constraints will preclude exploitation of hydrocarbon reserves in the Arctic areas of East Siberia and offshore in Arctic seas until at least the 1990s, exploration in these areas will increase throughout the remainder of the decade. In order to ensure the prolonged economic viability of these forbidding regions, the Soviets will continue to invest heavily in developing the necessary infrastructure and transportation links with industrial supply centers and markets. Particular emphasis will be placed on maintaining and supplementing their huge fleet of cargo vessels and powerful icebreakers operating along the Northern Sea Route -- still the most important Soviet Arctic transportation mode.

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# Soviet Arctic Economic Activity

## Introduction

The Soviet Arctic encompasses some 8 million square kilometers, or over one-third of the area of the Soviet Union.* It consists of four distinct regions that stretch some 7,000 kilometers across the northern periphery of the Soviet Union, spanning 11 time zones. From west to east these regions are: the European North and the northern Urals; the northern lowlands of West Siberia; the uplands of northern East Siberia; and the rugged mountains and the Kolyma Lowland of the Far Northeast. The most developed of these is the European North, which encompasses the Kola Peninsula and the coastal zone up to the Ural Mountains. Railroads connect valuable iron, coal, apatite, and aluminum resources to the industrial USSR. Northern West Siberia is nearly in the mid-stage of its development, with significant hydrocarbon exploitation well under way and with the rudiments of a transportation system in existence. Hydrocarbon exploration is just beginning in northern East Siberia, but the region has been the site of nickel, cobalt, platinum, and diamond exploitation for many years. The Far Northeast -- the most remote and least developed of the four regions -- produces gold, tin, and coal from numerous small sites.

Compared with that of US and Canadian Arctic regions, the Soviet Arctic environment is more inhospitable -- with colder continental climate, larger swampy areas, greater extent of permafrost, and more rugged terrain. The swamps of West Siberia and the tundra along the windswept coastal areas are frozen for much of the year, permitting land operations in the winter but under the coldest temperatures. Thawing during the brief summer period renders these areas nearly impenetrable. Farther inland the temperatures decrease because of continentality. Eastern Siberia, for example, consistently records the lowest temperatures on earth and its uplands along with the mountains of the Far Northeast are blanketed with snow for more than six months a year.

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*For simplicity, the Arctic region here is defined as the area north of 60° latitude in Siberia and north of the Arctic Circle in European USSR.

Sample Arctic Conditions

| Station | No. of days with Max. temp. below 32°F | No. of days with Max. temp. 0°F or below | No. of days with snow cover 6" or more |
|---|---|---|---|
| European USSR | | | |
| Amderma | 232 | 60 | 98 |
| Nar'yan Mar | 188 | 43 | 157 |
| Murmansk | 152 | 9 | 118 |
| West Siberia | | | |
| Khanty-Mansiysk | 162 | 40 | 144 |
| Dudinka | 233 | 109 | 220 |
| Salekhard | 200 | 75 | 163 |
| East Siberia | | | |
| Ust'-Kamo | 168 | 84 | 167 |
| Khatanga | 243 | 136 | 132 |
| Tiksi | 243 | 143 | 8 |
| Far Northeast | | | |
| Cherskiy | 224 | est 182 | 190 |
| Zyranka | 213 | 178 | 187 |
| Okhotskiy Perevoz | 194 | 168 | 185 |

The harshness of the Soviet Arctic's natural environment combined with its remoteness from supply centers and market places continues to constrain its development and sustain its shortage of manpower. Since Tsarist times, the government has tried to induce migration into the region: by subsidizing settlers, by forcing convicts to work in lumbering and mining operations, and, more recently, by offering wage and fringe benefits to workers in the oil and gas exploitation areas. The net result is that in spite its environmental drawbacks, the Soviet Arctic is more populated than any other Arctic area in the world. Several cities have populations of over 100,000 (Murmansk Vorkuta, Surgut, Nizhnevartovsk, Noril'sk, and Yakutsk); many others, especially in the West Siberian area, have over 10,000 inhabitants. In 1959 only 186,000 people inhabited northern West Siberia. By 1981 the population had reached 865,000, of which 75 percent was urban (in cities or worker settlements). Of the 35 urban places, 29 were founded after 1960. Labor turnover, however, is high and the Soviets are constantly faced with the problem of providing the amenities required to keep skilled workers in the Arctic region.

## Hydrocarbons of the Soviet Arctic

The Soviet Union ranks first in world oil and natural gas production. Moreover, with what are by most estimates among the largest petroleum reserves in the world as well as an estimated 43 percent of world gas reserves, the Soviet Union can be expected to maintain high fuel production well into the next

century. Much of the Soviets' energy wealth can be attributed to their efforts during the past two decades to discover and exploit the hydrocarbon-rich regions of the Soviet Arctic. To date, these efforts have been concentrated on the West Siberian Basin, which in 1983 accounted for some 60 percent of the USSR's total oil output and over 50 percent of its gas output. While there are some producing oilfields in the European Arctic region and hydrocarbon exploration has begun in the East Siberia and, to a lesser extent, in the Far Northeast and off the Arctic coast in the Barents Sea, West Siberia -- where most of the vast reserves have been assessed and the infrastructure to support exploitation and transportation has been developed -- will probably continue to be the Soviets' leading hydrocarbon-producing region into the 1990s.

Onshore Oil Reserves

Of the Arctic oil-bearing regions, the West Siberian basin, most of which is in the Arctic area, contains the largest oil reserves -- some 79.1 billion barrels or 58 percent of total Soviet reserves, according to a USGS estimate. Reserves in the European USSR -- which are located in the Komi ASSR's Timan-Pechora Basin, only a small portion of which is north of the Arctic Circle -- are estimated at 3.5 billion barrels. Northern East Siberia occupies the largest portion of the Soviet Arctic and has a potentially favorable area for oil and gas occurrence of over 3 million square kilometers. Estimates of oil reserves in this region, although based only on preliminary exploration, amount to 7.3 billion barrels. Little information is available about reserves in the Far Northeast.

Onshore Oil Production

The Soviets produced 12.3 million barrels of oil per day (mb/d) in 1983 and have set goals of 12.4 mb/d for 1984 and 12.6 mb/d for 1985. As in the past, attainment of these goals will be heavily dependent on production from West Siberian oilfields -- whose share of their total oil output the Soviets expect will increase from 60 percent in 1983 to 63 percent by 1985. Additional increases (from .38 to .46 mb/d) are expected from fields in the Timan-Pechora Basin of the north European USSR during the 1980-85 Five-Year Plan, but only one large producing oilfield in this region -- the Vozey -- is north of the Arctic Circle.

The search for Arctic oil began in the West Siberian Basin in the 1960s as petroleum production in the then major producing areas, such as the Volga Urals and Soviet Central Asia, was stagnating or declining. Since the 1970s, this basin has contributed the most to the growth of the Soviet oil industry and during recent years has been solely responsible for the small increase in overall Soviet production totals as output from its fields has continued to grow -- from 6.2 mb/d in 1980, to 7.1 in 1982, to 7.3 in 1983.

Initially production in the West Siberian Basin was concentrated on the large oilfields of Ust-Balyk, Zapadno-Surgut, and Yuzhno-Surgut. As output from these fields began to level off, the Soviets were able to boost their oil production considerably by opening mammoth fields such as Samotlor, Fedorovo, and Mamontovo. These latter three fields still dominate West Siberian oil production, even though all but Fedorovo are in decline. Samotlor produces 2.8 mb/d, Fedorovo .73 mb/d, and Mamontovo .56 mb/d. Other major West Siberian fields such as Kholmogor and Sutormin are now beginning production or are being expanded.

Although West Siberian oil production is expected to increase for several years, the rate of growth has slowed and segments of the Soviet oil industry are arguing for a shift of focus to East Siberia and to the offshore basins of the Arctic Seas. The Soviets acknowledge, however, that oil production from these areas will not be a factor until the next decade.

Onshore Gas Reserves

According to new Soviet estimates published in 1983, the Arctic areas of Siberia contain about 75 percent of the Soviet Union's estimated 34.3 trillion cubic meters ($m^3$) of explored natural gas reserves. Northern West Siberia predominates with an estimated 24.8 trillion $m^3$, while almost 1 trillion $m^3$ are located in Arctic East Siberia. Exploration and discovery of reserves in the West Siberia area accounted for most (92 percent) of the increase in estimated Soviet reserves between 1974 and 1980.

Several supergiant gasfields in West Siberia -- where the Soviets are currently concentrating their exploitation efforts -- hold the majority of these natural gas reserves, with Urengoy being the largest.

Reserves (in billion cubic meters)
as of Janurary 1980

| Supergiant | Explored ($A+B+C_1$) | Probable ($C_2$) |
|---|---|---|
| Urengoy | 7,770 | 285 |
| Yamburg | 4,096 | 661 |
| Zapolyarnoye | 2,632 | 39 |
| Bovanenko (Yamal) | 2,239 | 1,912 |
| Medvezh'ye | 1,243 | |
| Kharasavey (Yamal) | 861 | 404 |
| Kruzenshtern (Yamal) | 363 | 757 |

Yamburg Gasfield, located just to the north of Urengoy, is currently under development; initial production is scheduled to begin about 1986 or at least sometime in the late 1980s. Zapolyarnoye Gasfield, lying about 130 kilometers northeast of Urengoy, and the three remaining supergiants on the Yamal

Peninsula, located 450-500 kilometers north of the Arctic Circle, are not yet scheduled for exploitation.

According to 1980 Soviet estimates based on preliminary exploration, recoverable gas resources in Yakutsk ASSR and Krasnoyarskiy Kray -- the Arctic sector of East Siberia -- amount to 989 billion $m^3$. In the Far Northeast little exploration work has been done and no overall estimates of gas reserves are available. In 1982 some exploratory drilling took place in an area near Anadyr', south of the Chukotsk Peninsula facing the Bering Sea. Showing some signs of oil and gas deposits, this area may be targeted for more detailed exploration in the future.

In the European Arctic the only onshore gas reserves are located in the northern Timan-Pechora Basin. The Layavozh Gasfield, lying north of the Arctic Circle, contains a little over 100 billion $m^3$ of probable reserves. The offshore extension of this basin, however, probably contains most of the gas reserves in the area.

## Onshore Gas Production

Exploitation of natural gas deposits in the Soviet Arctic lagged slightly behind oil development during the 1970s, but by 1983 Arctic natural gas -- all from northern West Siberia -- was to have accounted for over 50 percent of the USSR's planned production of 536 billion $m^3$.

The Medvezh'ye Gasfield was the first of the West Siberian fields to be exploited. Discovered in 1967, the field began production in 1972 and plateaued in 1977 at about 70 billion $m^3$ per year. Urengoy Gasfield was discovered in the mid-1960s, but production did not begin until 1978. With the concentration of Soviet exploitation efforts on this field, Urengoy is currently producing over 30 percent of the USSR's natural gas output. It is expected to peak at a production rate of 250 to 270 billion $m^3$ per year. Arctic gasfields in areas other than West Siberia are not expected to be a factor before the 1990s.

## Offshore Hydrocarbons

The continental shelf areas of the Soviet Arctic are the largest in the world -- covering almost 4 million sq km (an area a little less than half the area of the United States). Encompassing seaward extensions of onshore basins known to contain hydrocarbons as well as individual Arctic Sea basins with geologic formations potentially favorable for the occurrence of hydrocarbons, these shelf areas provide the Soviets with opportunities for extensive future hydrocarbon exploration.

Offshore exploration in the Soviet Arctic is in the preliminary stages. The western Arctic seas, in particular the Barents Sea and parts of the Kara Sea, have been covered by seismic, gravity, and aerial magnetic surveys. In addition, the

Soviets have conducted some exploratory drilling on islands and archipelagos of the western Arctic seas and have drilled into the southern edge of the western Arctic waters from fixed platforms. Most recently, they have begun amassing more detailed information on the extent of offshore hydrocarbon occurrence by drilling farther offshore, in deeper waters of the Barents Sea. To facilitate their search for oil and gas under the difficult environmental conditions existing in the icy Arctic seas the Soviets in 1979 ordered specially built drill ships from Finland -- each of which is capable of drilling to depths of 6,000 meters from waters up to 300 meters deep. By 1983, the Rauma-Repola Company had delivered three of the vessels -- the Valentin Shashin, the Victor Muravlenko, and the Mikhail Mirchink.

Barents Sea. Because of optimistic preliminary surveys, generally shallow depths (many areas, especially in the southern sector, are less than 200 meters deep), and the least amount of sea ice of the all the Arctic seas, the Barents Sea has been targeted first for extensive surveys by the Arctic drilling ships. In 1983, the Muravlenko and the Shashin both operated in the Barents Sea completing work on exploratory wells. In May 1983, the Shashin began drilling at a point (71°34'N/37°03'E) that the Norwegians estimated to be 1 nautical mile within an area claimed by Norway in its longstanding dispute with the Soviets concerning the USSR-Norway maritime boundary.

The dispute derives from the conflicting methods used by the two countries to define maritime boundaries. The Soviet position is based on a 1926 decree in which the USSR claimed all land and islands in an Arctic sector enclosed by the meridian lines extending due north to the pole from its territorial extremities. In the European West, the Soviets advocate use of the same meridian (32°04'35") to separate USSR-Norwegian economic interests in the Barents Sea. Norway rejects Soviet claims and maintains that the continental shelf boundary should be an equidistant line between its mainland and island territories and those of the USSR. The result is that some 150,000 sq km of the Barents Sea continental shelf is in dispute. Negotiations to resolve this dispute began in the mid-1970s but have been in abeyance since 1981; renewed talks are scheduled for sometime in 1984. A bilateral treaty covers fishing rights in the disputed area.

In the central (Soviet) sector of the Barents Sea, the Soviets have signed an agreement to cooperate with the Boconor Consortium (formed by seven Norwegian companies) in exploring oil and gas deposits. In the southern sector of the Barents Sea between the island of Novaya Zemlya and the mainland lies the Pechora Sea. In this area the Timan-Pechora Basin extends into the water creating a large offshore area with considerable hydrocarbon potential. According to USGS estimates, the mean of undiscovered recoverable hydrocarbon resources of the Timan-Pechora/Barents Sea area at 8.3 trillion $m^3$ of natural gas and 25.3 billion barrels of oil.

Kara Sea. During the next Five Year Plan (1986-90) the Soviets may extend offshore drilling to the Kara Sea, which lies off the coast of northern West Siberia. Some of the known onshore giant and supergiant gasfields extend into the Kara Sea giving the area significant hydrocarbon potential. The Oil and Gas Journal reported in 1982 that a Soviet study placed Kara Sea gas resources at nearly 11 trillion $m^3$. Soviet geologists believe that large oil and gas accumulations may be found in the southwestern part of the Kara at relatively shallow depths of 1,000 to 2,000 meters.

Laptev, East Siberian, Chukchi, and Bering Seas. Much less is known about the hydrocarbon potential underlying Arctic seas in the eastern sector of the Soviet Arctic coast, where only gravity and magnetic surveys have been conducted. Because of the region's harsh climate and difficult ice conditions, only a giant find would be economical to exploit. Although a 1983 USGS survey concluded that the hydrocarbon potential of the northeastern Siberian continental shelf was poor, Meyerhoff, the US geologist, believes the Chukchi Sea Basin area may be a continuation of the hydrocarbon-rich geology of Northern Alaska. Also, the Anadyr' and Khatyrka depressions of northeastern Magadan Oblast probably extend into the Bering Sea toward US waters south of St. Lawrence Island.

## Minerals

The Soviet Arctic continues to play an important role in supplying key minerals to the Soviet economy. Despite increased costs incurred as a result of adverse environmental conditions and the remoteness of exploitation sites, the Soviets extract more Arctic minerals than any other country. Mineral exploitation is most heavily concentrated in the north European Arctic, which is closest to the Soviet industrial and population base and to links with the main transportation network. Mineral exploitation is less developed in remote East Siberia and the Far Northeast, which can be reached only by lengthy water routes using the Northern Sea Route supplemented by river transport and by a few road and air links to central cities.

The Noril'sk area, between East and West Siberia, is the most important extraction and processing center in the Soviet Arctic. In addition to producing about two-thirds of the nickel refined in the Soviet Union, the nickel ores of Noril'sk yield valuable platinum and cobalt. The Soviets plan to increase nickel and cobalt production by 30 percent during the $11^{th}$ Five Year Plan and most of the increase will probably come from the Noril'sk area. Because of the importance of Noril'sk, the Soviets have prioritized yearround operation of the Northern Sea Route between Murmansk and Dudinka, the main river port serving Noril'sk, for ore shipments and for delivery of supplies to the mining center.

The Kola Peninsula in the north European USSR also contains large mining and metallurgical operations for nickel, as well as for apatite, iron ore, and copper. Copper-nickel ores extracted and processed at Monchegorsk, Nikel', and Zapolyarnyy yield some 13 percent of the USSR's nickel as well as valuable by-products such as cobalt, silver, gold, platinum, and copper. Together the Kola centers and Noril'sk produce over 80 percent of Soviet refined nickel.

The world's largest apatite deposits are located in the Kirovsk-Apatity area of the Kola Peninsula, which in 1982 produced 17.7 million tons of apatite concentrate used to supply over 70 percent of the raw materials for Soviet phosphate fertilizers. The Soviets plan to increase apatite production at Kirovsk-Apatity to 19 million tons in 1985 and to build a third concentration plant there. Iron ore extraction on the Kola Peninsula is centered at Olenogorsk, which has proven reserves of over 300 million tons.

The most important coal-producing area in the Soviet Arctic is the Pechora Basin in the northern Urals area. Centered on the cities of Vorkuta and Inta, the basin produced 28 million tons of coal in 1983; about 60 percent of its output is coking coal. With explored reserves of some 9 billion tons, the Pechora Basin is likely to continue as an important coking coal source in the future. Large unexplored coal resources are in East Siberia's Lena and Tunguska Basins, most of which lie in the Arctic region. The Soviets estimate that these basins contain some 58 percent of the overall geological coal resources of the USSR. Since, however, only a small percentage of these have been explored and since they are so remotely located, they probably will not be exploited to any significant degree in this century.

Numerous small mining sites in East Siberia and the Far Northeast regions of the Arctic produce minerals of national importance for the Soviet Union. Substantial amounts of gold are mined in the Far Northeast, particularly from sites along the Kolyma River. The Soviets attach a great deal of importance to the mining of this mineral -- as evidenced by the construction of a nuclear powerplant at Bilibino, a main gold mining support city located north of the Arctic Circle. In addition, much of the cargo carried on the eastern sector of the Northern Sea Route is designated for the gold exploitation areas.

Diamond sales are estimated to be one of the larger earners of Soviet foreign exchange. Since they were discovered in the mid-1950s, diamonds from the Yakutsk ASSR of Eastern Siberia have dominated Soviet production (accounting for about 90 percent).

Tin mining areas in the Arctic regions of the Far Northeast and East Siberia account for a large share of Soviet tin production, which ranks second in the world. Because demand for this metal is high, however, the Soviets continue to import large amounts of it. Scheduled increases in tin extraction and

production in East Siberia will probably be used to offset domestic deficits.

Accessibility

The remoteness and the inhospitable conditions that inhibited natural settlement in the Soviet Arctic now constrain the development of the transportation needed to support current resource exploitation. Especially lacking are railroads, which have been the backbone of Soviet transportation for years.

The only operating railroads in the Soviet Arctic connected to the national network are the few railroad trunk lines leading to base cities centered in resource areas -- in West Siberia, to Surgut, Nizhnevartovsk, and Novyy Urengoy; in the north European USSR, to Murmansk and Vorkuta. Although distances are great and these lines often are only single tracked, they provide important all-weather connections with industrial centers of the Soviet Union. Main road links in the Soviet Arctic are few and far between. Only the Kola Peninsula and the Yakutsk-Magadan areas have long-distance all-weather roads. Instead the Soviets are concentrating road development on the construction of yearround hard-surfaced connections between established port or base cities and resource exploitation sites. Air transport to all major cities in the Arctic and to most base cities in the hydrocarbon exploitation areas is provided by Aeroflot, the Soviet civilian airline. Although the most expensive means of transportation, aircraft are particularly important because they can be used when other modes are shut down.

In the absence of an effective road and rail network leading to most of the Arctic region, the Soviets have relied heavily on marine transportation, which can move large quantities of cargo over long distances at low cost. The Northern Sea Route (NSR), which extends across the entire Soviet Arctic coast, has long been an important northern supply route to Arctic river and sea ports. Supply routes from the south are provided by arterial rivers flowing northward from key ports that junction with the Trans-Siberian railroad -- the only cross-country east-west transportation route in the USSR. The BAM (Baykal-Amur-Mainline) railroad being constructed north of and parallel to the Trans-Siberian will provide additional tie-ins to Siberian cities and resource development areas as it intersects major rivers of East Siberia.

Vessels on the Ob' and Irtysh Rivers supply bulk cargo to main bases in the West Siberian oilfields at Surgut and Nizhnevartovsk and to the support city of Nadym in the gasfield exploitation area of northern West Siberia. The Yenisey traffic handles some of the mineral export from and supplies to the Noril'sk area via the ports of Dudinka and Igarka. River vessels on the Lena River bring cargo southward from the NSR ports and northward from Ust'-Kut ports on the BAM railroad. Kolyma River vessels carry bulk cargo between NSR ports and mining areas and

also link the NSR ports to the Yakutsk-Magadan highway. The biggest problem, however, has been to cope with sea ice and rivers frozen for much of the year.

The following chart indicates some distances to key cities in the Arctic resource areas via various transportation modes.

Approximate Distances (Kms)

| Resource exploitation center | By Air from: Moscow | By Air from: Novosibirsk | By water from: Murmansk via NSR and rivers | By water from: River ports on railroads | By rail from: Moscow | By rail from: Moscow to Nearest rail city |
|---|---|---|---|---|---|---|
| West Siberia | | | | | | |
| Surgut | 2100 | 800 | 3800 | 11-1600 | 2800 | -- |
| Nizhnevartovsk | 2300 | 700 | 4100 | 13-1600 | 3000 | -- |
| Novyy Urengoy (Nadym on water) | 2300 | 1200 | 2500 | 25-2800 | 3500 | -- |
| Noril'sk | 2800 | 1600 | 2500 | 1900 | -- | 3300 |
| East Siberia | | | | | | |
| Yakutsk | 4800 | 2700 | 5200 | 1800 | -- | 7300 |
| Vilyuysk | 4400 | 2300 | 5200 | 2400 | -- | 5200 |
| Khatanga | 3400 | 4000 | 3600 | -- | -- | 4100 |
| Far Northeast | | | | | | |
| Anadyr' | 6100 | 4800 | 6300 | -- | -- | 8500 |
| Cherskiy | 5500 | 4000 | 4600 | -- | -- | 7300 |
| Zyranka | 5300 | 3700 | 5400 | -- | -- | 7300 |
| European: | | | | | | |
| Murmansk | 1400 | 2900 | -- | -- | 1900 | -- |
| Vorkuta (Labytnangi on water) | 1800 | 1700 | 2700 | 22-2400 | 2200 | -- |

## Northern Sea Route

Access to the Arctic regions from the Arctic seas has been a main Soviet objective since the 1930s, when the Northern Sea Route (NSR) was established; maintaining effective operations along the NSR continues as a priority activity for the Soviets at the present.

The NSR is still the primary maritime lifeline for cities along the Arctic coast. Extending over 6,000 kilometers, the route is completely ice free only in the westernmost sector at Murmansk. Icebreakers, however, keep the route open from Murmansk to Dudinka on the lower Yenisey almost yearround except for a short six-week period in May and June when the river ice is breaking up. The Murmansk-Yenisey route accounts for about 3 million tons of cargo out of the annual total of nearly 7 million tons carried on the NSR.

In the central portion of the NSR, where particularly heavy icing occurs in key straits off the East Siberian coast, shipping lasts only from August to October. Navigation is also seasonal in the eastern sector, lasting from June to December in the Bering Sea off the Soviet eastern coast and from mid-June to mid-October in the East Siberian Sea off the northeastern extremities of the USSR.

Besides Noril'sk, the western sector of the NSR serves the oil and gas exploitation areas of West Siberia through ports on the Ob' River estuary. Icing conditions in the Kara Strait sometimes require ships to detour around the northern tip of Novaya Zemlya. The seasonal ports in the central and eastern NSR serve mineral exploitation in East Siberia and the Far Northeast. Severe icing and an early onslaught of the Arctic winter, however, can jeopardize activity, especially in the eastern sector. In October 1983, for example, some 40 supply vessels were stranded in the ice in the Chukchi Sea off the northeastern Arctic coast, forcing the Soviets to use all available icebreakers to effect rescue operations.

## Icebreakers

Indications are that the Soviet Union intends to maintain and supplement its extensive fleet of over 400 vessels operating along the NSR. Icebreakers are instrumental in keeping the western sector open and the eastern sector navigable as long as possible. Three nuclear-powered icebreakers are the backbone of the fleet -- the Sibir', the Leonid Brezhnev (formerly named the Arktika), and the Lenin; a fourth, the Rossiya, was launched in November 1983 and will join the fleet in 1984 or 1985. The USSR and Finland are collaborating on a new shallow-draft nuclear-powered icebreaker for the Yenisey River to be constructed during the period 1986-90.

Several other types of diesel-powered icebreakers are employed along the NSR -- many built by Finnish companies. In addition, in 1983 Finnish ship builders delivered two of seven extremely shallow draft (2.5 meter) icebreakers for operation on the Ob' and other Siberian rivers.

Besides icebreakers the Soviets have invested heavily in multipurpose icebreaking freighters capable of negotiating ice up to 1 meter thick. Two Finnish companies (Wartsila and Valmet) were contracted to construct 14 of these cargo vessels designated the Noril'sk class; so far 10 have joined the fleet. Capable of carrying 200,000 tons of cargo, the vessels combine special features of a container carrier, Ro-Ro ship, and a bulk carrier; they can also deliver cargo directly onto ice if port facilities are lacking. In addition the Soviets are constructing their first nuclear-powered icebreaking lighter and container ship. The ship can carry 70 lighters (barges), each with a cargo capacity of 360 tons.